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ABSTRACT

This case study examines the history and current circumstances of education in the Gila River Indian Community (Arizona) in the context of its participation in the Utah, Colorado, Arizona, New Mexico, Rural Systemic Initiative (UCAN RSI), which aims to improve science and mathematics achievement through systemic reform. This report describes tribal history and economic conditions; the school system and its involvement with the UCAN RSI; and progress on the National Science Foundation's "six drivers of educational system reform": implementation of standards-based curriculum, supportive policies, convergence of resources to support math and science programs, broad-based parent and community support, improved student achievement, and improved equity of achievement. Located south of Phoenix, the reservation is slowly recovering from years of forced dependence. The seven elementary and middle schools include BIA, tribal, public, and parochial schools. The one high school has very low attendance as many students go off reservation for high school. All reservation schools belong to UCAN's Arizona Tribal Coalition. Coalition teachers meet regularly for professional development and support. As a result of alliances with businesses and other schools, some teachers are developing a culturally relevant math and science curriculum. Evaluators found weak to moderate evidence of developing success on the six drivers of reform. Although education is recognized as a way to help the community moved forward, systemic reform on the reservation is a difficult proposition. Multiple jurisdictions prevent alignment of policies, and resources have always been a struggle. However, the coalition's emphasis on professional development has had some impact. (SV)

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A Case Study of Gila River Indian Community (Arizona) and Its Role as a Partner in the NSF-Supported UCAN Rural Systemic Initiative (RSI)

Prepared

for

The NSF Rural Systemic Initiatives Evaluation Study

by

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Foreword

The visitation team thanks the following people for their cooperation during the site visit: Karen Brighton, Arizona Tribal Coalition Leader; Phil Hibner, Director of the ASU-East American Indian Program; William Johnston, Principal of the Casa Blanca Elementary School; Sister Martha Carpenter, Director of St. Peter's Mission School; Phillip Verdugo, Principal of the Sacaton Middle School; Joyce Baldwin, Coordinator of the Gila River Community Schools Coalition; Bill Walters, Principal of the Gila Crossing Elementary School; Kim Franklin, Curriculum and Instruction Specialist at the Gila Crossing Elementary School.

Gila River Indian Community Site Visit Report

The Gila River Indian Community traces its roots to the Hohokam, prehistoric Indians who migrated to the Gila River (Arizona) region around 300 B.C. This group farmed along the Gila River Basin and found ways to irrigate their crops by diverting water from the river with an elaborate irrigation system that featured hundreds of miles of canals. Most of the canals were about 10 feet deep and 30 feet wide. They were dug with wood and stone tools, and the dirt and debris were carried away in large baskets by the women.

A thriving civilization farmed the desert along the canals until around 1200 A.D., when the Hohokam vanished with no trace or explanation of their disappearance. Old Pima legends say that Se-Eh-Ha, one of the creators, returned from banishment with reinforcements to drive the River People from their homes. Archeological findings suggest that the Pima and Papago tribes are descendants of the Hohokam.

Sometime in the 1700s, the Maricopas fought with other Colorado River tribes. They kept moving eastward until the middle of the nineteenth century, when they settled with the Pimas along the Gila. The two tribes formed a strategic alliance against the Apaches and other enemies. Today the Pima and Maricopa live together in the Gila River Indian Community. The "Indian Community" name was chosen to be inclusive of both groups.

There is also a Salt River Pima-Maricopa Indian Community that is east of Scottsdale (northeast of Gila River) and an Ak-Chin reservation for the Maricopas. Gila River, Salt River, and Ak-Chin all have very close relationships. Over time, the bonds have been made stronger by intermarriage. Today, families with Pima and Maricopa members live in each community.

The first Christian missionaries came to the area in 1694. They introduced new crops (including wheat), horses, and cattle. This opened the door to immigration for Mexicans and Europeans. In 1854, the Gadsden Purchase made southern Arizona a United States Territory. Soon soldiers, traders, and Indian agents arrived on the scene. The Pimas provided the newcomers with food and water and acted as guides, soldiers, and allies to help break the threat of Apache attacks. The Pimas were known for their ability to grow food, and gold and silver prospectors and other immigrant settlers often planned to restock their supplies when they reached Pima lands.

The 372,000-acre reservation, 40 miles south of Phoenix in Maricopa and Pinal Counties, was established by an act of Congress in 1859. Conditions on the reservation in the early 1900s were described as "wretched poverty" by one writer (Moore-Shaw, 1974). For nearly 70 years, the Pima were governed by the Bureau of Indian Affairs (BIA). The loss of independence is thought to have contributed to the drug and alcohol problems and violence that exist on the reservation even today.

With the passage of the Wheeler-Howard Act in 1934, tribes were once again able to rule themselves after years of forced dependence on the white man. Many tribes instituted constitutions and governments. The Gila River Indian Community is headed by a governor and a tribal council that is made up of elected representatives from each of the seven districts on the reservation. Tribal administrative offices and departments were established in Sacaton.

In 1937, the U.S. government completed work on the Coolidge Dam on the upper Gila River to create the San Carlos Reservoir. This stopped the flow of water to the Gila River Indian Community. The loss of water caused a profound negative change in the Pima way of life. The tribe went from being self-sufficient farmers to being dependent on government surplus foods. The change in diet led to problems with obesity and diabetes. The Pima have a higher per capita incidence of diabetes than any other group in the world.

The Gila River Indian Community is slowly beginning to recover from the harm that resulted from dependence, unemployment, drastic change in diet, alcoholism, poor schooling, disrupted life styles, etc. The community is increasing its industrial, retail, and recreational economic base. The community has opened 3 industrial parks housing 36 operations. One of the parks, Lone Butte, is nationally acclaimed as one of the nation's most successful Native American industrial parks.

The community continues to depend upon agriculture to grow its economy. Twelve thousand acres of community farms support a variety of crops such as cotton, wheat, millet, alfalfa, barley, melons, pistachios, olives, citrus, and vegetables. Independent farming operations cultivate an additional 22,000 acres of similar crops, bringing the total agricultural product value to more than $25 million.

In September 1994, Gila River Indian Community opened an 8,500 square foot casino, Wild Horse Pass, located near the heavily populated area of south Phoenix and Chandler. A second temporary facility, Vee Quiva, built next to the casino, opened December 13, 1997. (Casinos provide about 1,000 jobs with 80 to 85 percent going to tribal members.) They are both owned and managed by the community, with all profits being utilized for tribal operations and economic development as well as providing additional social services to community members.

A specific decision was made to use casino revenue for building an infrastructure to serve the community as opposed to distributing monies to individuals as a monthly or annual check. According to community leaders the spending priorities of the tribal council are (1) providing kidney dialysis centers, (2) fire and police protection, and (3) job creation. The goal to create more jobs has led to a greater emphasis on education. Below is an excerpt dealing with the relationship between job creation and education that was taken from Anna Moore Shaw's, *A Pima Past*:

> . . . We too can be politicians, administrators, teachers, and leaders in all walks of life. We need only pride, confidence, experience, and, most important, education. Education is the golden key to success for all people. In a nutshell, it teaches us service to others, patience, determination, understanding, and compassion. It enables the American Indian to value his heritage and use it for the benefit of others, to stick to his job and not be a quitter, to budget his time and money for the future, to have the poise and ability to express himself to others.
>
> The list of education's benefits is, in truth, unending. But I would like to finish my little list with what I consider to be the greatest benefit of all - interracial understanding. . . .

There are seven elementary/junior high schools and one high school (that had very low enrollment at the time of our visit) in the Gila River Indian Community. Among the schools in the community are BIA grant schools, parochial schools, public schools, state charter schools, tribal schools, and tribal charter schools. Each school on the reservation is independently controlled through its own local board of trustees. These boards appear to have limited accountability to the tribal council.

The tribal council is not responsible to the state and federal government on matters of education because the Gila River Indian Community is a sovereign nation. However, it is clear that the council provides resources to the school if it is demonstrating success or proposing to do something that is deemed to be especially beneficial. Like any political organization, there is a general feeling that personal connections and family ties do influence some decisions in the distribution of discretionary funding to individual schools.

- Blackwater Community School, pre-K-3, BIA grant
- Casa Blanca Elementary, K-4, BIA grant
- Casa Blanca Middle School, 5-8, state charter
- Gila Crossing, K-6, BIA grant
- Sacaton Elementary, K-4, public
- Sacaton Middle, 5-8, public
- St. Peter's Mission School, K-8, parochial/tribal
- Vichji Himdag, 7-12, tribal charter

Students are generally free to attend any school they wish, and many make multiple transfers each year. There is no mechanism in place to track students. Many students go off the reservation for high school. Bus transportation is provided free to students to attend these schools, including off-reservation public high schools. Approximately 1,250 students who reside on the reservation attend public or private schools off the reservation. The transition from reservation primary schooling to off-reservation secondary schooling has been identified as one of the points where students are most at risk of dropping out. The high school graduation rate is reported to be 12

percent. One person reported that a bus may begin the year with 80 students attending high school and end the year with 8-10 students.

All of the reservation schools belong to the Arizona Tribal Coalition (ATC) of the Utah, Colorado, Arizona, New Mexico, Rural Systemic Initiative (UCAN RSI). UCAN's mission is to provide support to selected schools for comprehensive programs that broaden the impact, accelerate the pace, and increase the effectiveness of improvements in standards-based science, mathematics, and appropriate applications of technology.

In its first two years, the ATC was not as effective as it has been in subsequent years. Part of the problem was lack of cohesiveness among the schools. Once the tribal council lent its support to the initiative, problems began to be resolved. One such problem confronting teachers in the Gila River Indian Community was a sense of isolation. Even though the community is a relatively small geographic area, teachers did not typically have contact with colleagues from other schools. They lacked the opportunity to share ideas and obtain support.

The outstanding accomplishment of the ATC is the creation of the Gila River Community Schools Coalition. Through the coalition, teachers from most schools meet once a month to discuss issues relevant to math and science education. The teachers then return to their schools and share the information that they received with other teachers. The ATC also provides professional development workshops and summer institutes on standards-based curriculum and assessment through a partnership with WestEd.

With its limited resources (2 FTEs for 42 schools with one-tenth of the UCAN budget) and multiple jurisdictions (local board, district, tribe, county, state, federal), one might think that the ATC has little chance of influencing math and science education. However, the site visit team saw some promising examples of math and science education in the reservation schools.

ATC appears to be most successful when it can make math and science education a priority for charismatic school administrators like Bill Walters of the Gila Crossing School, Sister Martha Carpenter of the St. Peter's Mission School, or Joyce Baldwin of the Sacaton schools. These leaders have visions for their schools. Somehow, their visions have come to include math and science education. These dynamic individuals are able to mobilize the resources and the support necessary to change policy and implement curriculum.

Due to the proximity of the Intel Corporation's headquarters, the schools in the Gila River Indian Community enjoy some unique advantages. Through the Intel Partnership Project, the Gila River Education Network has been established. Through the network six technology education centers were established in 1996. The centers have networked the entire reservation, providing the tribe with access to the Internet and World Wide Web. Through 1996, Intel's total donation to the partners added up to more than $1.2 million in cash and equipment grants, plus in-kind and volunteer time.

With the technology education centers forming the foundation of the partnership, another component is the school-to-community alliance. In an effort to engage and keep Indian students involved in math and science, alliances between the Gila River Department of Education and reservation public schools have been formed.

As a result of the alliances, teachers are developing a culturally relevant math and science curriculum. This effort is linked with an innovative community-based education model under development at the Santa Fe Indian School (New Mexico), which uses real community issues and problems to teach the basics of math and science. The goal is to make the curriculum relevant to the needs of the Native American community.

Today, the Gila River Indian Community occupies 372,000 acres of land located adjacent to the metropolitan area of Phoenix. The population is hard to determine because the reservation does not correspond with traditional census tracts. In 1990, the population of Sacaton, the largest town on the reservation, was 1,452. Other towns such as Laveen and Bapchule provide few opportunities for shopping or recreation. Families live in housing ranging from modest frame houses, to mobile homes, to manufactured homes, to roughly built shelters made of native wood materials and other salvage type materials.

Paved roads link the town and provide residents ready access to I-10 (that links Phoenix to Tucson). Side roads are generally graveled or unimproved dirt roads. The terrain not under irrigation is typically desert with little evidence of grazing or other agricultural value. However, it is known that wild horse bands range in the area as do other wildlife typical of a southwest desert biome. Although some would find the landscape and the area to be stark and somewhat forlorn, others would find it to be picturesque and even beautiful, especially during sunrise and sunset.

In the sections that follow, specific attention is paid to NSF's six drivers of systemic reform. Discussion centers around indicators that have been associated with each driver. The accomplishments of the Gila River Indian Community schools are examined, with emphasis on how the UCAN project has influenced the movement toward standards-based education.

Driver 1—Implementation of a comprehensive, standards-based curriculum as represented in instructional practice, including student assessment, in every classroom, laboratory, and other learning experience provided through the system and its partners.

According to the perceptions of the visitation team, the Gila River Indian Community schools seem to be at both ends of the curriculum continuum. At some schools there are outstanding examples of attempts to develop innovative, standards-based, culturally relevant math and science curricula. Other schools use canned, substandard curricula.

In addition to technology education centers, the Intel partnership called for an alliance between the Gila River Department of Education and reservation public schools. As a result of the alliance, teachers are developing culturally relevant math and science curricula. This effort is linked with an innovative community-based education model under development at the Santa Fe Indian School that uses real community issues and problems to teach the basics of math and science. The goal is to make the curriculum relevant to the needs of the Native American community.

Some schools in the Gila River Indian Community seem to have embraced a community- based education model. For example, Gila Crossing School has developed a curriculum around the Pima's historical vocation of farming. The centerpiece of the effort is the school's garden. Around this centerpiece, the teachers indicate that they have constructed a curriculum that is not dependent on outside materials, but is supplemented by them. The total school effort is designed to make a curriculum for students that is "totally inclusive." All students participate in all activities.

The garden provides a cultural link to the history of the Pima tribe. The school staff report that there was a significant turnaround at the school when they began to develop culturally relevant curricula. And with gardening as a main theme, the school now reports that the curricula are almost completely locally constructed. Thus, there is no sense of bringing in curricula that were produced for children in places far removed from Gila River.

There is a conscious effort to use experimental design to teach the methodology of science. For instance, four compost pens have been built at the back of the garden. Each is set up in a different way. Two contain decomposing microbes. Two contain what is called "gin waste" (this is the material left over from the ginning of cotton). These are constructed in a two by two matrix so that there are four unique containers: (1) no microbes, no gin waste; (2) with microbes, no gin waste; (3) no microbes, with gin waste; and (4) with microbes, with gin waste. The students examine the process of decomposition and determine which produces compost in the shortest amount of time. There are, however, some cultural constraints to the activities that can be undertaken. For example, students cannot dissect animals like frogs because it is disrespectful to their spirit. Apparently, there are a number of unique cultural issues that influence how and what is taught in science.

Other schools in the community also have gardens. Sacaton Middle School has a rather sophisticated greenhouse and growing plot arrangement, as well as individual truck/tractor tire gardens in which various vegetables are planted and used for science and math studies. Casa Blanca School has a small, unattended garden that is used primarily by the teacher of the gifted class.

At Gila Crossing, cultural relevance is also accomplished by bringing in elders from the community to aid in teaching components of the lesson. This aspect of the schooling requires that the curriculum be shaped so that the timing of the lessons corresponds to nature as prescribed by the elders' knowledge of environment. For instance, in order to study hibernation as a component of life science, this instruction must take place during the time of year when hibernation occurs.

In this warm desert environment, it is difficult to imagine which animals hibernate, but the expert local knowledge of the elders is important in placing these events in a cultural context.

In addition to being culturally relevant, the curriculum is also standards based. BIA grants schools are given the choice of using the BIA curriculum or teaching to the Arizona Academic Standards. The principals at most schools in the community chose to use the state standards. One principal reasoned that this helps prepare students for state-run, public high schools. Said he, "Even though we had a choice, we decided that we live in Arizona and we should accept the Arizona standards and align our curriculum with them." Students take the Arizona Instrument to Measure Standards (AIMS), but scores are not sent to the state.

It is clear that the schools place the greatest priority on reading, writing, and math—not science. This may be because the AIMS tests achievement on reading, writing, and mathematics standards. The teachers may be emphasizing these areas. A second reason may be because academic success requires strong language skills. For many of the students, English is not their first language. Teachers may be trying to help the students learn necessary language skills.

The curriculum is also subject to the vagaries of multiple jurisdictions. For example, the Gila River Indian Community is slowly regaining its water rights. Some educators thought it would be appropriate to develop a curriculum around riparian areas. However, a tribe official decided that he didn't like the idea and blocked it.

Gila Crossing School tries to integrate programs and curriculum. The garden in which students receive a lot of their math and science education also serves to raise food for student and family consumption. This is part of the Quest program to reduce the incidence of diabetes. Working in the garden is also seen as a way to inculcate Pima values such as hard work, sharing, and respect for elders. Networked computers enable teachers to integrate curriculum. For example, in science class, students work on science fair projects. In language arts they work on the technical reports to accompany their science fair projects.

The greatest weaknesses noted in the indicators for driver #1 is the lack of coordination with science and mathematics instruction at higher levels. There seems to be little knowledge among the teachers or administration with regard to the science and mathematics instruction that is to come at the higher grade levels. If the teachers have knowledge or understanding of the total K-12 curriculum, they did not indicate this.

At the current time, the Gila Crossing teachers are not participating in RSI activities and apparently never have had courses available for their teachers related to mathematics and science instruction. In the past, however, teachers did attend workshops and organization meetings associated with UCAN. Some teachers traveled to New Mexico where they learned science and mathematics activities. Some teachers also participated in a UCAN trip to the Jet Propulsion Laboratory in Pasadena, CA. Since all teachers at one school must be certified in special education to accommodate "total inclusion," many are taking courses to meet these requirements and don't have the time for additional work in science and math education.

Teachers and administrators from Gila Crossing reported that the best possible benefit that could come from UCAN involvement would be to have teachers from other schools come and see what has been accomplished. This is not happening. Teachers and administrators from other schools reported that UCAN had been quite helpful by providing assistance in understanding the state and national standards, in aligning their curricula with these standards, and in developing assessment tools.

In summary, schools in the community seem to be at both ends of the curriculum continuum. Teachers at the Gila Crossing School are making significant progress toward implementing a high quality curriculum aligned with national standards for all students; putting in place a hands-on, inquiry-based instruction in classrooms; and making the curriculum/instruction relevant to the locale of the student. Other schools are progressing at a slower pace.

Driver 2—Development of a coherent, consistent set of policies that supports: provision of high quality mathematics and science education for each student; excellent preparation, continuing education, and support for each mathematics and science teacher (including all elementary teachers); and administrative support for all persons who work to dramatically improve achievement among all students served by the system.

The schools in the Gila River Indian Community are governed by multiple jurisdictions—community, district, tribe, state, and nation. In addition to the formal governance structures, it is likely that influential informal governance structures also exist (clan?). Each jurisdiction has its own policies.

Each school in the Gila River Indian Community has a separate administration and local board of education. There is a clear, coherent vision that encompasses all students at the Gila Crossing school. This is not an apparent result of UCAN involvement, but is a direct line from the school's principal down through all teachers. There is constant evaluation of teachers in an informal manner. The principal reports that he is in each class every day.

The fact that each school has its own board means that, at the local level, the organizational structure is horizontal. This would enable the boards to be close to their schools and to respond to their schools' needs in a timely fashion.

The schools are affiliated with the Pima tribe. There may be some disconnects between the schools and the tribe. It was reported that some tribal resolutions mandating the schools to work with the Arizona Tribal Coalition (ATC) have not been carried out. There is no enforcement. Sometimes it comes down to whether the administrators want to comply.

The reservation is located in Arizona. There appear to be disconnects between the tribe and the state of Arizona. Even though they comply with the Arizona Academic Standards and their students take the AIMS, Gila River Indian Community schools do not report test or other school information to the state because the Pima tribe is a sovereign nation.

It seems unlikely that policies will ever be totally aligned, because there is not a direct line of authority. However, this does not negate the potential for the school to have appropriate policies. No evidence was found to indicate that policies support preservice education of teachers, recognize and reward excellence in teaching, support the system's capacity to collect and use data for continuous program improvement, and encourage qualified teachers to remain in rural, small schools.

Driver 3—Convergence of all resources that are designed for or that reasonably could be used to support science and mathematics education—fiscal, intellectual, materials, curricular, and extracurricular—into a focused and unitary program to constantly upgrade and renew and improve the educational program in mathematics and science for all students.

UCAN provides the Arizona Tribal Coalition (ATC) with minimal resources. It receives one-tenth of the UCAN budget with which it hires 2 FTEs to work with 42 schools (53 percent of NSF/SI funds go for administrative costs including 5 coprincipal investigators). With its limited resources and multiple jurisdictions (community, district, tribe, county, state, federal) it would seem that the ATC has little chance of influencing math and science education. However, the site visit team saw some promising, culturally specific examples of math and science education in the reservation schools.

ATC is most successful when it can make math and science education a priority for charismatic school administrators like Joyce Baldwin of the Sacaton schools, Sister Martha Carpenter of the St. Peter's Mission School, or Bill Walters of the Gila Crossing School. These leaders have visions for their schools that include math and science education, and they are able to mobilize resources in support of their visions.

Sister Martha is a resource magnet. Joe Garagiola, the famous baseball player and broadcaster, gave money to the school for bathrooms and a basketball court. He also introduced Sister Martha to the Bidwell family, owners of the Phoenix Cardinals. Air Force engineers built an addition to the school as a training activity when Williams Field Air Force Base was preparing to close. When the school was featured on NBC's Today show, Sister Martha established a relationship with Katie Couric. Later, when Couric did charity work for the National Library Association, it

donated a library full of books to the school on her behalf. A New York Times technology columnist sends the school the applications that software companies send him to review. A local contractor built the sisters a new convent. The groundskeeper for the Cubs baseball team has promised to deliver sod for the walking course where the children exercise daily.

Due to the proximity of the Intel Corporation's headquarters, the schools in the Gila River Indian Community enjoy some unique advantages. Through the Intel Partnership Project, the Gila River Education Network was established. Through the network six technology education centers were established in 1996. The centers have networked the entire reservation, providing the tribe with access to the Internet and World Wide Web. Intel's total donation to the partners through 1996 added up to more than $1.2 million in cash and equipment grants, plus in-kind and volunteer time. ATC was not instrumental in the creation of the partnership, but was an active partner during implementation.

As a result of the Intel Partnership Project, the schools are well equipped with computers and have unusual access to the Internet through donated lines/paid subscriptions by technology companies, etc. Generally, the schools are equipped with 2 or more computers per classroom plus a laboratory in which 30 or more computers are located. Each school seems to have a person designated as the technology resource person. His/her duties include management of the equipment, advising and assistance to teachers, and teaching classes on the use of computers. We saw children as young as kindergarten age using the computer to draw basketball courts, etc. We did not see much use of computers for recording data from science experiments.

The casino, resort, and Gila River farms have made new resources available to schools. These resources, however, do not appear to be equally distributed. The Tribal Council seems to reward schools that perform well. For example, the Council paid for new third and fourth grade classrooms at Saint Peter's Mission School and bought the greenhouse for the Gila Crossing School. Some schools take what is given to them and multiply it. The Gila Crossing School has a contract to grow 5,000 chile peppers in its greenhouse for a community plant sale. There seems to be a strong undercurrent of entrepreneurism in the most successful schools of the community.

Perhaps the reason for the entrepreneurism is that schools in the Gila River Indian Community must still fight for resources. For example, the site visit team was told that when some schools on the reservation were chartered by the state of Arizona, they received state money in addition to BIA money. There was an outcry because people thought the schools were double-dipping. The additional money, however, was just enough to bring the schools up to the median funding level for the state.

We did not see evidence that budgets had been increased specifically for science and math. However, the teachers did not mention needs that were unmet. It is rather clear that there is a low level of expectation for resources, and anything that is received is greatly appreciated. We also saw no evidence that there is any formal division or designation of other external funds to support educational reform and/or the UCAN effort for science and math.

The availability of human resources is also a problem. Teachers moving to the Southwest teach on the reservation for a short time until they can get a job in Phoenix. Turnover among teachers and administrators is huge. At Gila Crossing, prior to Bill Walters, there were 9 principals in 11 years. Walters promised to stay. Part of the reason for success of Gila Crossing is that Walters can attract and hold good teachers. At St. Peter's the presence of the nuns gives the school a stable base upon which to build.

We observed class sizes from fewer than 20 to combined grades with 40 students per class. With the additional funds from the tribal council, there are plans in place to reduce the sizes of the large classes. However, there are two problems to address: lack of space for adding classes and the availability of teachers with the appropriate orientation, willingness to work at this remote site, and acceptance of relatively low salaries for jobs that may require a commute from one of the adjacent cities (i.e., Phoenix, Chandler, Mesa, etc.).

There is a collective recognition that these students have considerable needs and that few educational resources are available in their homes; therefore, meeting the needs of the students is a primary important factor. A small program is being started to develop a "computer checkout" program that provides computers for families to use at home. At this time, about 15 computers, or 20 percent of Gila Crossing School have been placed in that way.

There is little evidence that there are resource personnel in the community who are able or experienced in facilitating curricular/school reform. Therefore, professional development is very important. Professional development has been offered by the UCAN division serving this area, and some on-site professional development work has been provided. To some extent, the foci of some of the professional development activities are not appropriate or needed by some teachers. They think that they are further along in that particular area or it is based on standards or other factors that are not applicable to the educators in the Gila River community.

Driver 4—Broad-based support from parents, policymakers, institutions of higher education, business and industry, foundations, and other segments of the community for the goals and collective value of the program based on rich presentations of the ideas behind the program, the evidence gathered about its successes and its failures, and critical discussions of its efforts.

There are some good examples of community support of schools (and by extension math and science education reform). One example is the Gila Crossing School. According to administrators, five years ago the school was on the verge of being shut down. The building was dilapidated: asbestos contamination, bullet holes in the door, etc. Student enrollment was low. Mr. Walters was hired as a consultant, and he asked the community, "What do you want to do? Close? Renew? What?" With the community's help, Walters turned the school around. Now the school and the community have a unique relationship.

Breakfast and lunch are provided free to all the children in the school AND to anyone in the community who is hungry. During the site visit we joined the students for a breakfast of toast, eggs, and apple juice. There were a few community people in the gymnasium for breakfast. Lunch room monitors are unnecessary because community people make sure that the children display good behavior.

Gila Crossing School also has a unique computer loan program. The school obtains throwaway computers, refurbishes them, and loans them to the parents of students. As of February 2000, 15 out of 80 families had received computers. The school also uses its big garden to promote community gardens. Students are free to take seedlings from the greenhouse home with them. Many families have fenced in small plots of land and planted a community garden. These are examples of how one school is promoting science and technology education in the community.

A lunch was served at the groundbreaking ceremony for the museum that will house the ancestral remains of the tribe that will be returned from the Smithsonian. The children of the Gila Crossing School got in the lunch line first. (Normally the elders would be the first group to go through the lunch line.) Without being told, the children prepared lunches and served the elders of the tribe first, which surprised and impressed those present. The tribal council has reciprocated the respect that the students of Gila Crossing have shown. The council had the greenhouse built and recently gave the school land for a football field.

St. Peter's Mission School is another good example of broad community support. At one point in time, the mission school was an initiation rite target for some of the 23 youth gangs on the reservation. The sisters convened a community meeting and told attendees that the school would have to shut down if the sisters didn't feel safe. Among issues discussed was the level of police protection. During the discussion some discrepancies were apparent. Further investigation revealed that the director of the BIA had ghost officers on the payroll and was pocketing the salaries. An outcome of the meeting was that police protection was improved and the sisters got two Great Danes to guard the mission. At St. Peter's all parents must donate 80 hours of volunteer time each academic period.

Coordination is loosely maintained through an organization named the Gila River Community Schools Coalition. However, it should be understood that each school is independent of one another and has its own board. The need to coordinate their work is dictated by the fact that the schools serve a common community, but with full recognition that students do have choices as to which school they attend. Because all the schools have chosen to adopt the Arizona standards, their efforts are focused on meeting these standards.

Educational improvements/reform efforts are occurring in a relatively slow and informal manner. The project staff informed us that in this culture it is important that the multijurisdictional entities are on board first. It is estimated that it took as long as two years for improvements to be put into place, and then there was an effort to recruit schools or gain a commitment of interest. The various jurisdictional groups pass resolutions, but there has been a record of incomplete follow-

through for a variety of reasons, i.e., change of leadership, new/different priorities, loss of key personnel, etc.

Clearly, a lot of financial support has been made available to these schools from various sources. However, it is not clear that even this level of support is enough for greatest output and outcomes. In the past, little support was available for these schools and some were in great need of repair. Again, expectations are low, so any increase may be overly acclaimed as a critical element. It seems apparent that the schools are not equally funded, and the level may be dependent on the charismatic/entrepreneurship skills of the director and the school's ability to persuade the tribal council that it is serving the community in a successful and appropriate way.

The goals among stakeholders seem to be broadly defined and less specific than improvements in math and science. The lack of continuing education beyond the 8th grade is a substantial problem in this community. Maybe a general goal is satisfactory at this stage of reform. Survival in a complex society with some knowledge of how to resist falling back to a dependent condition are primary considerations.

While they may not associate their work with a specific reform initiative, all the teachers want to see students make greater improvements. At the same time, the lack of progress on the riparian project, which would be a good example of coordination and common acceptance of goals, has been put on hold because of political conflicts or the efforts of a relatively small interest group/individual.

The Arizona standards were adopted as the overall goals and standards for the schools of this community. The extent to which these are widely known or understood is not clear. Considerably more study or investigation would be necessary to be able to fully state that there is a common understanding of expected outcomes. However, some of the outcomes, e.g., participation and success in competitive comparisons, work related to the science fairs, etc., are clear.

When asked about the goals of the Gila Crossing School, the tribal elders on the school board said that they wished for the students to become self-sustaining adult members of the community. They want them to be prepared for the jobs that are available on the reservation. But there was no specific mention of science and technology. Others outside of this community said that the elders recognize that if the members of the tribe are to be independent of the outside world, then community members must become proficient and even experts in the science and technology areas. We did not hear this from the tribal elders. They have the money to provide the necessary education, but it is not clear that they can also prepare the work environment that will provide students with a place to use their expertise. The persons interviewed on the reservation all stated that there were many jobs available for students when they exit their schooling. They would like for their students to become capable workers, but they seem to mean that rather than becoming the laborers who keep a golf course green, they want them to become the persons who manage the course.

Driver 5—Accumulation of a broad and deep array of evidence that the program is enhancing student achievement through a set of indices that might include student achievements, test scores, higher level courses passed, college admission rates, college majors, Advanced Placement Tests taken, portfolio assessment, and ratings from summer employers that demonstrate that students are generally achieving at a significantly higher level in science and mathematics.

A central issue for the Rural Systemic Initiative (RSI) program is the assessment of student progress. If the RSI program is going to be successful, then there is a great need to identify the student gains that result from it. Specifically, these gains must be identified in mathematics and science. Gila Crossing students take the AIMS test. It measures achievement on the reading, writing, and mathematics standards. Science is not included in the AIMS in the grades that are taught at Gila Crossing. Students also take the Stanford 9 (see Table 1). St. Peter's was reported to have the lowest budget and highest test scores. However, like most parochial schools, this may be heavily influenced by low salaries for teachers and in-kind resources that never get reported in publicly accessible budgets.

Table 1. Summary of Stanford 9 Percentile Rank Scores for Gila River Schools

	3rd grade			4th grade			5th grade			6th grade			7th grade			8th grade		
School																		
Sacaton Dist.	R	L	M	R	L	M	R	L	M	R	L	M	R	L	M	R	L	M
96-97	26	29	23	30	33	29	23	20	21	20	11	21	22	21	20	26	16	21
97-98	13	14	09	23	26	18	26	23	22	26	17	22	29	26	14	26	19	19
98-99	15	16	09	16	17	13	24	23	21	30	20	21	24	21	23	26	18	18
Casa Blanca	R	L	M	R	L	M	R	L	M	R	L	M	R	L	M	R	L	M
97-98							21	11	08	15	09	15						
98-99							19	10	14	26	18	18	22	17	20			
Gila Crossing	Composite		M	Composite		M	Composite		M	Composite		M	Composite		M	Composite		M
98-99	09		05	10		18	14		21	22		25						

Note. 1999-2000 scores not yet available. R = Reading. L = Language Arts (writing). M = Mathematics

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An examination of Table 1 shows that students in Gila River schools are generally below the thirtieth percentile in math in grades 3 through 8. It is interesting to note a precipitous drop (from 96-97 to 97-98) in the percentile scores in math of third and fourth grade students in the Sacaton district. This may have been due to turmoil within the district or some other unknown reason.

Some administrators are not convinced of the usefulness of standardized testing. They think testing results from the various coalitions are not comparable because each started from a different place. Gila River Indian Community had no educational infrastructure to build upon. Further, each state has a different system of measurement that changes on a regular basis. Data reporting to Kirk Minnik & Associates, the external evaluator for UCAN, is said to be sporadic. Nonreporting is seen as an indication of noncomparability. Administrators also point out that BIA data do not go to the state of Arizona. This makes it difficult to collect and track data. Currently, it is not even possible to say for certain what the dropout rate is. (However, it is understood to be very high, especially at the high school level.)

There is a reported emphasis on assessment at the Gila Crossing School. Administrators report the use of "daily assessment," "STC embedded assessment," "rubric assessment," "narrative assessment," and standardized assessment in mathematics. UCAN has been identified as a means through which teachers have learned new assessment techniques. According to one educator, schools used portfolio assessments in the past. However, the high schools to which students transferred threw the portfolios away when they received them. According to administrators, the high schools wanted three pieces of information: letter grade, standardized test scores, and attendance/behavior. "It is hard to do authentic assessment when nonreservation schools don't care."

There is a lot of anecdotal evidence about academic achievement at the Gila Crossing School. Probably the most impressive evidence is the trophy display case. The trophies that students have won for academic achievement have the most prominent place in the display case. Among the trophies on display are the Governor's Cup (culture, language, and science), Intel Cup (computers and technology), Mr. Walter's Cup, and the Community Cup (most families at science fair). Throughout the years, GCS has sent 10 students to the national science fair competition. Below is a quote from the school's web page.

> Continuing a tradition started in 1996, Messina Lewis, Benjamin Thomas and Angel Koorey brought home top honors from the National Science Fair in Rapid City, South Dakota. Like Henrey Guerra and Steven Ramon in 1996 and 1997, the students were selected to represent our community at one of the most challenging academic events for students. The children compete with top students from all over the United States and Canada. The fair averages over 900 students each year. Gila Crossing and Estrella Mountain were the only schools from Gila River to attend the fair this year. Fifth and sixth grade students and their chaperones flew to Rapid City and were able to view Mt. Rushmore, Crazy Horse Monument, as well as attend the fair. Mr. Sharma, the trip leader, commented on

> how well the students did and how seriously they took their responsibilities as representatives of Gila River Community. According to Mr. Sharma, our students also got many compliments from the hotel manager and also the other places where we visited.

There is no mechanism in place to provide Gila Crossing School with feedback regarding what happens to students when they graduate and go on to higher levels of education. The administrators and school board reported that the schools to which the students go are required to make the data available. Apparently, there has been no attempt to get these data and examine them. Anecdotal information indicates that some students do return in subsequent years to report that they are doing well and are receiving straight A's at the higher grade level schools. [There was no accounting that accompanied this anecdotal information.] One informal assessment is how long it takes students to go from the off-reservation high schools to the Cesar Chavez accommodation school.

Driver 6—Improvement in the achievement of all students, including those historically underserved.

At the Gila Crossing School and St. Peter's Mission School, the goal is to influence all students. The children all wear a uniform of sorts—boys wear dark slacks and a school shirt. This contributes to a sense of equality that promotes full inclusion. At Gila Crossing, ALL teachers are receiving training that will lead to special education certification so they can accommodate special needs children without pulling them from the classroom.

Gila Crossing is a "full inclusion" school, which means that all students have opportunities to participate in all activities, such as the science fair and garden. At the Casa Blanca School only students in the gifted class receive those privileges. The teachers and administrators from Gila Crossing School proudly report that some of the students who have succeeded at the highest levels are identified as special education students. The teachers and administrators firmly believe that the students are a cohesive group who recognize that no one will be left out in the educational efforts.

This, however, does not carry over to students with discipline problems. The school director, Mr. Walters, reported that the children know that they have only one chance with regard to disruptions and rules. If they break the rules in a severe manner, they will not be allowed to return to the school. This was also noted at St. Peter's School. Sister Martha told us that the fact of having a waiting list with more students on it than are enrolled in the school leads to the recognition that any student can be removed and not allowed to return.

Conclusion

The residents of the Gila River Indian Community have a proud heritage. The interaction with the white man radically changed their way of life for the worse. Now the tribes are starting to prosper again. Education is recognized as a way to help the community move forward. Systemic reform in the Gila River Indian Community is a difficult proposition. There are examples of curriculum that some would describe as substandard and perceived to be "quick fixes" for deeply embedded problems in the schools and community. Because of the multiple jurisdictions, policy will probably never be fully aligned. Resources have always been a struggle. The Arizona Tribal Coalition (ATC) receives minimal resources from UCAN and must spread them out over a large number of schools. ATC focused its efforts on professional development through the Gila River Community Schools Coalition. The ATC has had a greater impact than one might expect. Somehow, ATC convinced charismatic education administrators to emphasize math and science education on their agendas. The result is some instances of outstanding, culturally relevant, community-based education; innovative partnerships that have broadened the resource base; and strong community support programs.

Table 2.

Rating of Educational System Reform Drivers

	Driver	Rating*
1.	Implementation of standards based curriculum . . .	1.5
2.	Policies supportive of quality math and science programs . . .	1.6
3.	Convergence and usage of resources to support math and science programs . . .	2.5
4.	Broad-based support and involvement of parents and others . . .	1.6
5.	Accumulation of broad and deep array of evidence that the program is enhancing student achievement . . .	2
6.	Improvement in the achievement of all students, including the historically underserved . . .	2

* 0 = Not present/no evidence; 1 = Weak evidence/beginning but sporadic; 2 = Moderate evidence/developing but visible success; and 3 = Strong evidence/operationally consistent and widespread

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